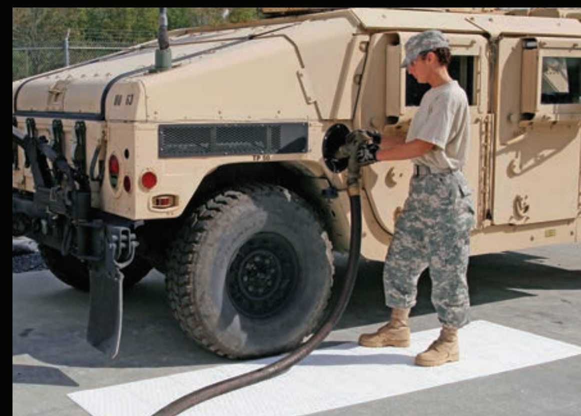
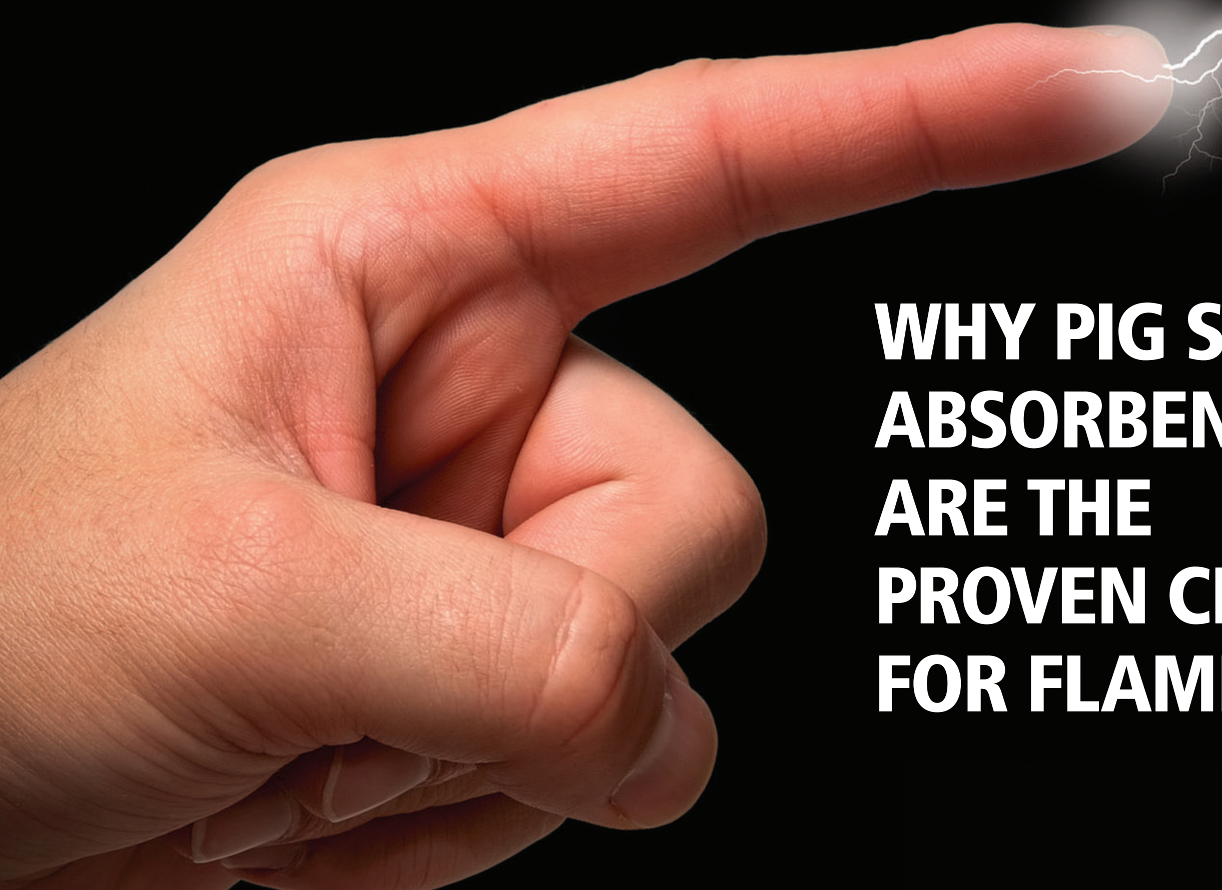
pig REPORT

IT ONLY TAKES ONE SPARK.





WHY PIG STAT-MAT ABSORBENTS ARE THE PROVEN CHOICE FOR FLAMMABLES.

INCLUDES INDEPENDENT TEST DATA

It only takes one spark.

You can follow all the guidelines, comply with every regulation, bond and ground every tank, fuel pump and container, but one simple fact remains: static electricity hides in plain sight and all it takes is one spark for disaster to strike — especially when there's a spill. Using PIG Stat-Mat Absorbents wherever flammable liquids are stored, transferred or dispensed is the best way to control the risk and keep personnel out of harm's way.

5 things you need to know before you buy static dissipative mats:

NFPA®

1) The mat should meet the NFPA 99 standard. No matter what a company says about the static dissipative capabilities of their mat, meeting the NFPA 99 standard for static decay is the only real way to be sure that the absorbent is proven to minimize the risk of static discharge explosions.

PIG Stat-Mat is the only one you can buy that has consistently proven it meets NFPA 99.

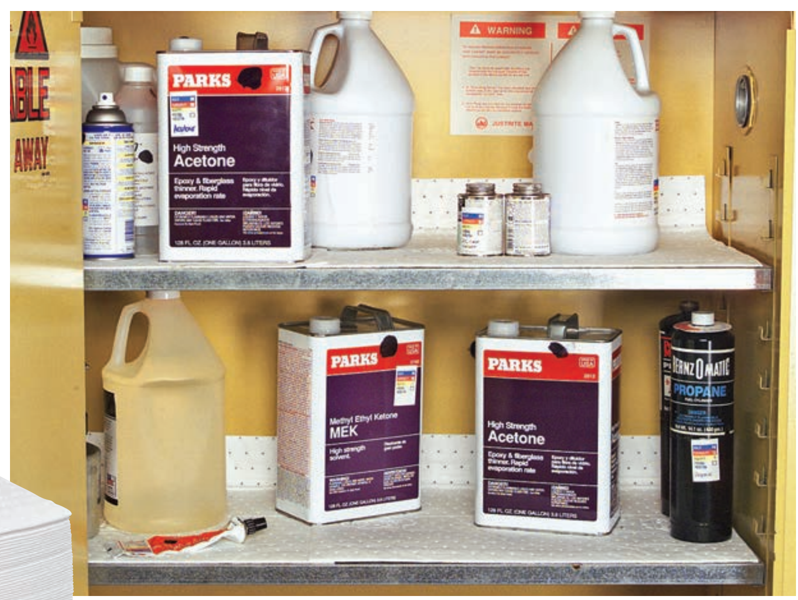
2) Only continuous manufacturing controls can assure that every mat off the line meets the NFPA 99 standard. It takes rigorous manufacturing controls and processes to assure that every mat dissipates static properly. New Pig holds ISO 9001 and 14001 certifications and performs continuous in-line voltage testing to make sure every Stat-Mat Pad is safe to use.

3) Packaging is almost as important as the absorbents inside. Because absorbents constructed of polypropylene naturally carry static charges, there is a significant potential for shipping and handling to cause friction between the plastic bag and the absorbents inside — resulting in static charging.

PIG Stat-Mat is packaged in bright pink, static-dissipative plastic that is similar to the packaging used to protect micro conductors and electronics from static.

4) Spring may bring the lowest humidity — and the highest risk for static ignition. Although winter is generally regarded as the driest season of the year, NOAA atmospheric data says otherwise about many locations in the US. What do Allentown, Pennsylvania, Chattanooga, Tennessee, Charlotte, North Carolina and Lincoln, Nebraska all have in common? Their lowest average humidity levels occur in April.

5) 89% of the US has weather conditions that contribute to static ignition. Static discharge explosions are not just a concern at high altitudes or in arid environments. When we tracked NOAA monthly data from 2002, we found that 89% of the 263 weather stations nationally have one or more months per year where relative humidity is 60% or less. The NFPA 99 standard is conducted at a relative humidity of 50%.



PIG Stat-Mat is safe enough to line flammable storage cabinets.

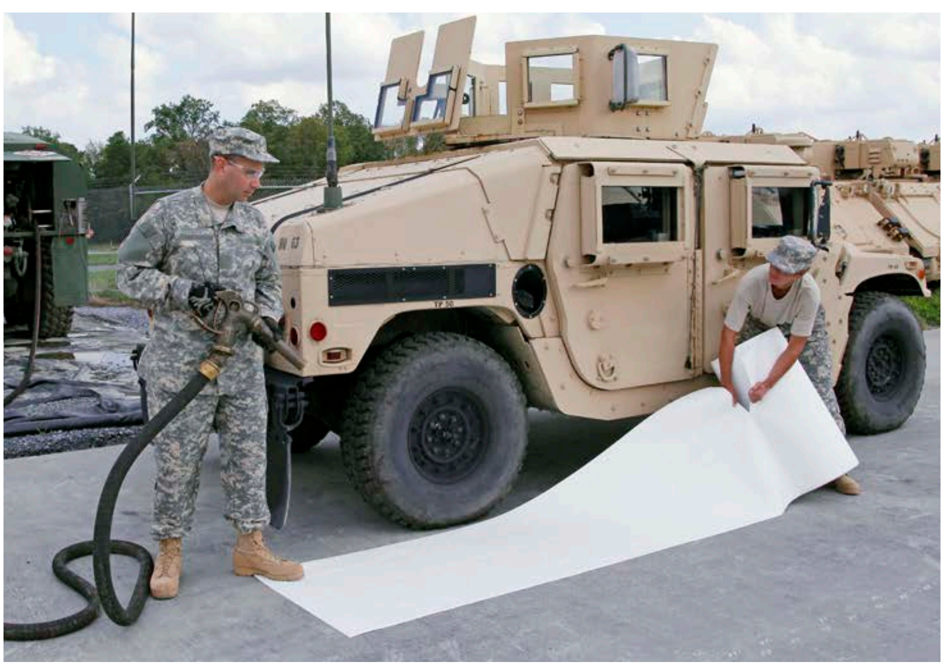
Spills, sparks and absorbents.

Static electricity is a contradiction. Even though it's generated through motion, the charge becomes stuck — static — if there's no path to the ground. And so it builds up where it sits, gathering enough energy until it can jump as a spark. Static electricity builds up as flammable liquids like gasoline, diesel fuel or jet fuel flow through pipes while they're being dispensed or transferred — and the charge takes several seconds to several minutes to dissipate after the fuel has reached the tank or container. If enough of a charge builds up, it can ignite the vapor in the air and cause a fire or explosion.

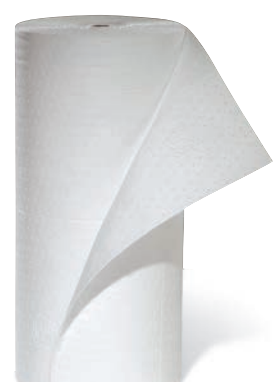
Static control measures like bonding and grounding, static collectors and additives provide ways for charges to dissipate before sparks can form. But despite all the regulations on the books and the safeguards in place, nearly 280 industrial incidents involving static electricity are reported to fire departments every year.

Refueling and liquid transfers create spills, so it makes sense to use absorbent mats in these areas to conform with environmental standards. The problem with conventional oil absorbents is that they're made from polypropylene — a plastic — and naturally carry a static charge. Independent testing has demonstrated that these mats can carry a charge large enough spark an explosion just by pulling one out of the bag. That's why using conventional oil absorbents around flammable liquids puts people in real danger.

The only way to be sure that a mat is safe to use around flammables is to confirm that it meets the NFPA 99 standard for static decay and surface resistivity.



PIG Stat-Mat won't build up static charges — even when friction can occur.



PIG Stat-Mat: built safe, proven safe.

PIG Stat-Mat is a specially treated oil absorbent that dissipates static electricity to reduce the risk of explosions and fires. That means Stat-Mat won't carry a charge whether it's being pulled from the bag, catching drips in a fueling area or soaking up a flammable liquid spill. Every PIG Stat-Mat Absorbent is manufactured with strict in-line controls to make sure it meets the NFPA 99 standard for static decay and surface resistivity. This is no hype: Independent testing proves it.

A product must dissipate a 5 kV static charge in under 0.50 seconds to pass — Stat-Mat does it in 0.01.
Here's a quick look at how PIG Stat-Mat performs:

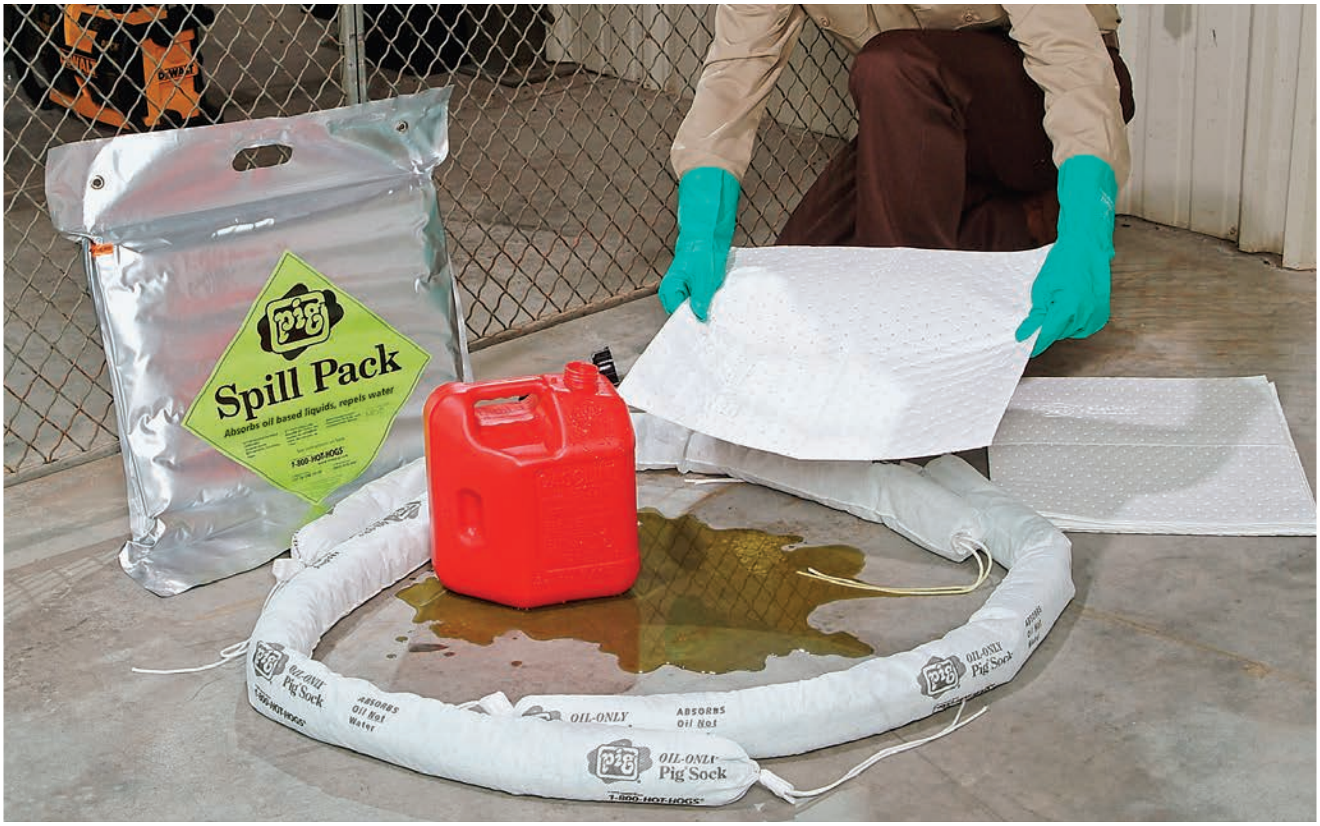
Static Decay

	PIG Stat-Mat
Initial charge: voltage must be less than 10 volts for testing purposes.	0
5 kV charge applied: Must discharge in less than 0.50 seconds.	0.01 seconds
Conclusion:	PIG Stat-Mat Absorbents pass the NFPA 99 standard for static decay.

Surface Resistance and Resistivity

	PIG Stat-Mat
Upper acceptance limit for static dissipative materials is 1×10^{11} Ω/sq. at 50% relative humidity.	2.05×10^9 Ω/sq. to 3.43×10^9 Ω/sq. **Static Dissipative**

See complete test results at the end of this section.



Once a Stat-Mat, always a Stat-Mat.

The static dissipative properties in PIG Stat-Mat have no expiration date — this is especially important when it comes to your spill kits. How do we know? We tested the Stat-Mat Pads from spill kits that had been placed at a customer facility four years earlier and the mat was as effective as the day we packed it. Here are the test results:

Anti-Static Aging Results

	Static Decay Positive Charge 50% CD Wire DC Volts	Static Decay Positive Second 50% CD Wire DC Volts	Static Decay Negative Charge 50% CD Wire DC Volts	Static Decay Negative Second 50% CD Wire DC Volts
New Stat-Mat Average	5000	0.008	-5000	0.008
New Stat-Mat Std. Dev, N=5	0	0.004	0	0.008
4-yr-old Stat-Mat Average	5000	0.008	-5000	0.008
4-yr-old Stat-Mat Std. Dev, N=5	0	0.004	0	0.008

MATERIAL EVALUATION REPORT

STATIC DECAY, SURFACE RESISTIVITY AND SURFACE RESISTANCE TESTING OF MAT SAMPLES

NEW PIG CORPORATION

AUGUST 15, 2012

MATERIAL EVALUATION REPORT
Static Decay, Surface Resistivity and Surface Resistance Testing of Mat Samples
New Pig Corporation
August 15, 2012

GENERAL

Electrostatic characterization tests were performed by ETS Testing Laboratories on samples submitted by New Pig Corporation under Purchase Order Number 15338dlm. Four (4) material types were tested for static decay, surface resistivity and surface resistance compliance.

TEST CONDITIONS

Date of Test:	8/15/12
Humidity:	50.0% RH
Temperature:	76°F
Conditioning Time:	53 Hours

TEST APPARATUS

HUMIDITY CONTROL

ETS Series 5000 Controller and Chamber are used to provide the controlled environment to condition and test the samples at the specified relative humidity. The system is capable of controlling the humidity to within 1% of the desired level with an accuracy of ±2% RH and is calibrated to standards traceable to NIST.

STATIC DECAY

An ETS Model 406 Static Decay Meter is used to perform static decay measurements. An ETS STM System Test Module is used to verify the calibration of the Static Decay Meter.

SURFACE RESISTIVITY AND SURFACE RESISTANCE

Surface resistivity and surface resistance measurements of planer material are performed using a Dr. Thiedig Milli-TO-2 Wide Range Resistance Meter in conjunction with an ETS Model 803B Surface/Volume Resistivity Probe. An ETS Model 809B Calibration Check Fixture is used to verify the calibration of the resistance test set-up.

TEST METHODS

The following test methods and specifications were used in the evaluation of the test material:

STATIC DECAY

Static decay testing is based on the test method described in Mil-Std-3010, Method 4046 "Electrostatic Properties of Materials". This test method requires a 3 x 5-inch test specimen be placed between a pair of electrodes electrically connected together and be conductively charged to both plus and minus 5000 volts. After the sample has accepted the applied charge, the charging voltage is removed, the electrodes are grounded and the time for the charge to bleed down to a specified cutoff level is measured. This test can be modified to evaluate different sample sizes and configurations. Most military and electronic industry specifications require decay time to be measured to the 1% (50 volt) cutoff level (previously designated as 0%). Applications referenced to NFPA (National Fire Protection Association) specifications require the decay time to be measured to the 10% (500 volt) cutoff level.

CALIBRATION CHECK

Prior to a static decay evaluation, a performance system check is made on the Model 406 using the ETS Model STM System Test Module. The STM is placed in the Faraday Test Cage in lieu of a test specimen. It produces a known decay time when plus and minus 5kV is applied. This test checks both the accuracy of the decay time measurement and the balance in decay times between positive and negative charging voltage polarities.

INITIAL CHARGE AND ACCEPTED CHARGE

Material that is static dissipative or conductive will have no measurable static charge on the surface and will be able to conduct the 5kV charging voltage across the surface when applied. A sample that has a measurable initial charge prior to applying the charging voltage indicates that the sample is either insulative or contains both dissipative and insulative characteristics on the surface. The magnitude of the initial charge is listed in the *IC Volts* column of the data sheet. Generally, a material that has both an initial charge and accepts the applied 5kV will not have a measurable decay time if the cutoff selected is below the level of the initial charge. Material with an initial charge, a very long or no charge/decay characteristics can be evaluated by noting the amount of charge conducted across the surface of the test material after applying 5kV for one minute. The more charge accepted after one minute, the more dissipative the material. This value is listed in the *AC Volts* column of the data sheet. No readings would be recorded under *Decay Time*.

SURFACE RESISTIVITY/SURFACE RESISTANCE

Surface resistivity per ASTM-D 257 has generally been the property used to describe the conductive, dissipative or insulative range of static control material. The ETS Series 800 probes conform to the concentric ring design specified. The ratio between the inner and outer electrodes results in a surface resistivity equal to 10X the measured resistance. It should be noted that surface resistivity is expressed in ohms per square, without regard to the size of the square.

Surface resistance per ESD S11.11 is used to evaluate static dissipative material. This resistance is equal to the actual resistance measured with the Model 803B Probe. A test voltage of 10 volts is specified for resistances between 10^4 and 10^6 ohms. A test voltage of 100 volts is required for resistances between 10^6 and 10^{11} ohms. Surface resistance is expressed in ohms.

Resistance measurements below or above these values may require different test voltages. Conductive materials (those materials with surface resistances below 10^4 ohms) are measured using either a current source (cs) or voltages equal to or less than 10 volts.

TEST RESULTS

The actual data taken is contained in the enclosed data sheets.

STATIC DECAY

The samples were charged to ±5kV and the time to dissipate 90% of the charge (10% cutoff) when grounded was measured.

GROUP	**MIN**	**MAX**	**AVERAGE** (Seconds)
A (Mat 215)	Less than 0.01	0.01	0.01
a (Mat 215 Reverse)	Less than 0.01	0.01	0.01
B (Mat 414)	Less than 0.01	0.01	0.01
b (Mat 414 Reverse)	Less than 0.01	0.01	0.01

No initial charges were recorded and the full 5kV charging voltage was accepted by the samples.

SURFACE RESISTIVITY

GROUP	**MIN**	**MAX**	**AVERAGE** (Ohms/Sq.)
A (Mat 215)	2.64×10^8 Ω/sq.	8.37×10^8 Ω/sq.	6.68×10^8 Ω/sq.
a (Mat 215 Reverse)	2.94×10^8 Ω/sq.	9.34×10^8 Ω/sq.	7.25×10^8 Ω/sq.
B (Mat 414)	1.96×10^8 Ω/sq.	8.11×10^8 Ω/sq.	6.17×10^8 Ω/sq.
b (Mat 414 Reverse)	1.11×10^8 Ω/sq.	9.35×10^8 Ω/sq.	6.50×10^8 Ω/sq.

Testing was performed using a test voltage of 100 volts.

SURFACE RESISTANCE

GROUP	**MIN**	**MAX**	**AVERAGE** (Ohms)
A (Mat 215)	$2.64 \times 10^7\ \Omega$	$8.37 \times 10^7\ \Omega$	$6.68 \times 10^7\ \Omega$
a (Mat 215 Reverse)	$2.94 \times 10^7\ \Omega$	$9.34 \times 10^7\ \Omega$	$7.25 \times 10^7\ \Omega$
B (Mat 414)	$1.96 \times 10^7\ \Omega$	$8.11 \times 10^7\ \Omega$	$6.17 \times 10^7\ \Omega$
b (Mat 414 Reverse)	$1.11 \times 10^7\ \Omega$	$9.35 \times 10^7\ \Omega$	$6.50 \times 10^7\ \Omega$

Testing was performed using a test voltage of 100 volts.

CONCLUSIONS

Most specifications for static safe material are written for packaging material. These specifications are also referenced for many other static safe applications.

STATIC DECAY

NFPA 99, which references MIL-STD-3010 (formerly FTM 101C), is commonly referenced for hospitals and hazardous locations and is also used as a guideline for packaging, filtering, paper, consumer products, cleanrooms and many other applications. This specification requires conditioning at 50% R.H. Acceptable materials should have a static decay time of less than 0.50 seconds when measured to the 10% (500 volt) cutoff level.

With average measurements ranging from less than 0.01 to 0.22 seconds, all sample groups met the static decay requirement of the specification.

RESISTANCE AND RESISTIVITY

Resistance measurements are used in the static control industry to help categorize materials. Although resistance and resistivity measurements alone cannot tell everything about a material's electrostatic performance, it is a good indicator, can help to establish a baseline, indicate differences between additives or additive levels, show differences within a sample group and characterize the effects of relative humidity on a material's performance. Depending on the specification referenced and the composition of the material, either surface resistivity or surface resistance (or both) may be applicable.

According to industry packaging material specifications such as ESD S.541 (formerly EIA-541) and Test Method ESD STM 11.11, Material having a surface resistance measurement of less than 1×10^4 ohms is considered conductive, between 1×10^4 and 1×10^{11} ohms is considered dissipative and readings greater than 1×10^{11}ohms would classify the material as insulative.

NFPA 99, which references test method ASTM-D-257 and requires conditioning at 50% RH, has an upper acceptance limit of 1×10^{11} Ω/sq at 50% R.H. Materials with resistivity measurements below this limit are considered acceptable.

	SURFACE RESISTIVITY	**SURFACE RESISTANCE**
Conductive	$<1 \times 10^5$ ohms/sq.	$<1 \times 10^4$ ohms
Dissipative	1×10^5 to 1×10^{12} ohms/sq.	1×10^4 to 1×10^{11} ohms
Insulative	$>1 \times 10^{12}$ ohms/sq.	$>1 \times 10^{11}$ ohms

With average measurements ranging from 6.17×10^8 to 3.92×10^9 ohms/sq. sample groups A (MAT 215) and B (MAT 414) met the surface resistivity requirement of the specification for a dissipative material.

NOTE: The data contained in this report has been generated using established industry, DOD, ETS or customer standards. Results and conclusions are based on the specific samples tested on this date under the environmental conditions listed. Ultimately, it is the responsibility of the end user to determine if a material is acceptable for use in a specific application.

REVIEWING YOUR DATA SHEETS

HEADER
Lists the purchase order, sample description, test conditions, date of test and the equipment used.

TEST RESULTS
Lists the individual measurements taken on each sample along with the polarity of the test voltage.

DATA ANALYSIS OF INDIVIDUAL SAMPLES
Average, standard deviation, range, minimum & maximum analysis for individual samples.

DATA ANALYSIS OF GROUPS
Average, standard deviation, range, minimum & maximum for each group of specimens giving the customer an overview of the performance of a group. This section is useful in providing information on specification compliance, group uniformity, etc.

AVERAGE
The mean value of all readings. The readings are summed and divided by the total number of data points.

STANDARD DEVIATION
The standard deviation represents the reliability of the data obtained. The higher the standard deviation, the more likely it is that readings far from the average will be obtained in subsequent tests. The standard deviation is calculated by taking the square root of the sum of the squares of the numeric difference between the reading and the average for each sample, divided by the number of readings considered.

MINIMUM
The lowest reading obtained in a sample group.

MAXIMUM
The highest reading obtained in a sample group.